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TO: Dr. D. Mills
Director of Research

MOTOR USE AND OVERALL END USE OF ELECTRICITY BY ONTARIO INDUSTRY

B.G. Woods

A study was performed to investigate the total electricity consumption for various types of loads throughout Ontario industry. The study identified the loads associated with a number of different motor uses (eg. pumps, fans, etc) as well as the lighting, heating and electrolysis loads. The information will be used to identify and prioritize projects according to their potential to reduce the demand for electricity in industry.

INTRODUCTION

An opportunity exists for significantly reducing the industrial motor load by increasing the efficiencies of the motor uses (such as fans or pumps), or using alternatives that are less energy intensive. This load reduction will be in addition to the savings from the high efficiency motor program. In order to initiate projects which tap into this potential, it is necessary to know how significant each of the motor loads are throughout Ontario industry. To obtain this information, a study was performed to identify the end uses of electricity throughout Ontario's industries. The scope of the project was limited to collecting existing data (ie. there was no active collection of data through energy audits) categorizing the applications into some common loads, and then weighting the data for the breakdown of industry in Ontario.

The data for the study came largely from a 1979 Drexel report [ref. 1] on the energy consumption in 108 industries. Although the report is slightly dated, it was found to be the most comprehensive reference in terms of the end use details, and the scope of industries covered. The data for each industry was weighted according to the electricity consumption for the respective industry in Ontario. The Ontario electricity consumption data came from the 1984 Statistics Canada data [ref. 5 - this is the latest data available in this format]. If no information was available about the load breakdown in an industry, the average load breakdown from the

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related industries (according to the SIC classification) was used. The load from these industries is included in the "others" columns in the attached tables.

Since the electricity consumption by the various end uses in industry cannot be verified, the accuracy of the data cannot be stated. However, the data from this study compares reasonably well with two notable sources as shown in Tables 13 and 14. Also, Table 14 illustrates the range of values that can occur in this type of end use data.

Any comparisons of specific load data with the results presented in this report should consider the following factors:

1) the industry classifications are often ambiguous, as some industries could fall under a few different classifications or even multiple classifications,

2) the data came from a report written in 1979, therefore any technologies that have only been implemented in the last 10-15 years will not appear in the data, and

3) the end use data does not exist for all the industries in Ontario, therefore, loads unique to an industry with unavailable data will not appear in the results.

RESULTS

The summary of the electricity consumption in the major industry categories (two digit SIC categories) is presented in Table 1. The results are also highlighted in graphical form in Figures 1 to 6. The end use within each major industry category is listed in Tables 2 to 12. The end use summary for each four digit SIC industry category is presented in the supplementary report #E90-24-K.

A comparison of the data from the current study with previous Ontario Hydro data is shown in Figure 1. The results in Figure 1 also serve to re-emphasize the significance of motor loads in Ontario industry. The four largest motor loads were found to be materials handling, fans, pumps, and air compressors. The relative magnitudes of these motor loads are shown in Figure 2.

The industries which have the largest materials handling load are shown in Figure 3, along with the estimated loads. The materials handling load is composed of a number of sub-categories such as conveyors, robots, lift trucks, and cranes. Although information about the sub-categories was not available for this study, the magnitude of the materials handling load justifies further investigation to identify the materials handling sub-categories and their electricity consumption.

The industries with the largest fan loads are presented in Figure 4. The largest fan load is in the mining industry, where the fans are largely used for ventilation. Aside from the mining industry, the fans are mainly used for drying, heating, and cooling.

The industries with the largest pump loads and air compressor loads are shown in Figures 5 and 6 respectively.

While compiling the data for this report, it was noticed that cooling towers represent a significant load throughout industry. The cooling tower load is identified in the supplementary report (Ontario Hydro Research Division Report # E90-24-K) and is divided between pumps and fans in this report. The load for cooling towers was found to be approximately 350 MW, or 5% of the total industrial electricity consumption. Therefore, the load reduction potential of cooling towers is worthy of further investigation.

CONCLUSIONS

In conclusion, the information in this report is in the form that will help to prioritize projects and allocate appropriate resources to research projects in order to achieve the most load reduction possible. It will also help to provide focus for a project with regard to the types of industries which will be able to use a technology. It is also hoped that this information will be updated and added to (ie, filling in data not available) so that the planning decisions can be made on the best possible data.

ACKNOWLEDGEMENTS

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Figure 1 - End Use of Electricity in Ontario Industry

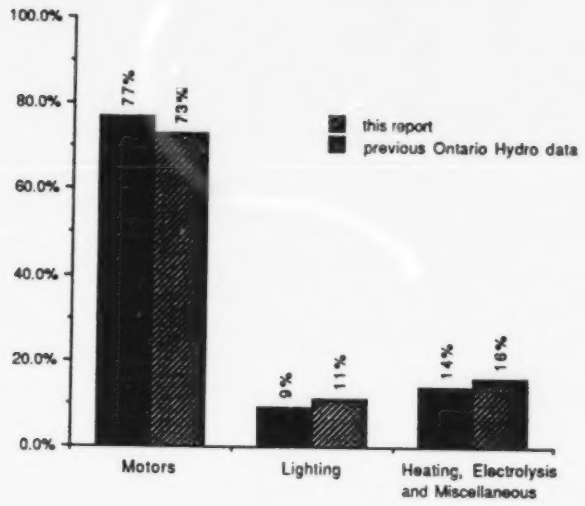


Figure 2 - The Four Largest Motor Loads in Ontario Industry

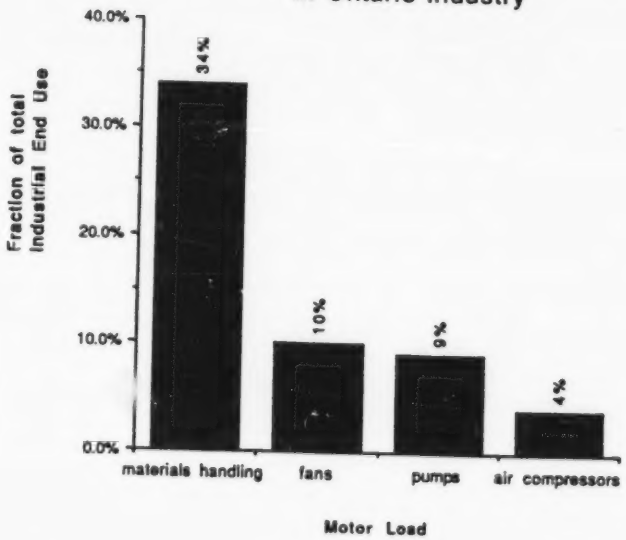
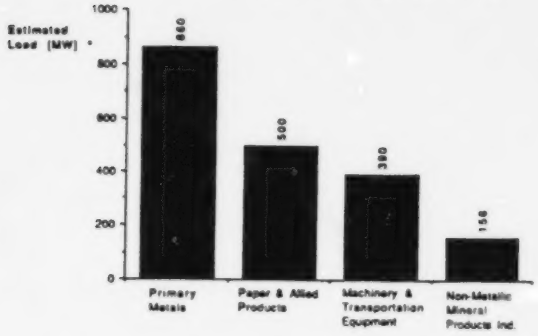
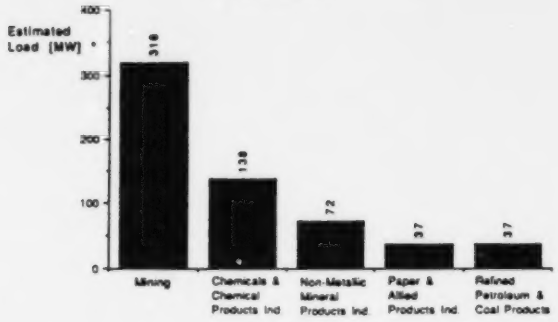


Figure 3 - The Industries with the Largest Materials Handling Load



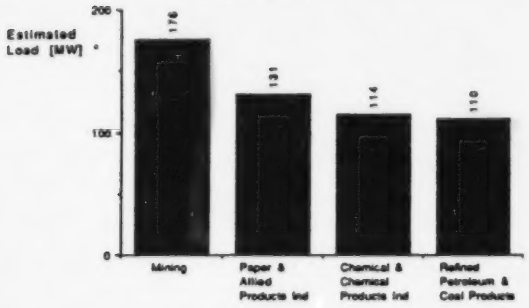
* based on two shift operations (ie. 5000 operating hours/year)

Figure 4 - The Industries with the Largest Fan Loads



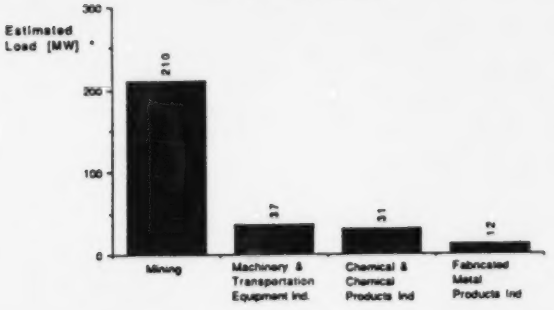
* based on two shift operations (ie. 5000 operating hours per year)

Figure 5 - The Industries with the Largest Pump Loads



* based on two shift operations (ie. 5000 hours per year)

Figure 6 - The Industries with the Largest Air Compressor Loads



* based on two shift operations (ie. 5000 operating hours per year)

Table 1A - Summary of the Electricity Use in Ontario's Industries

	Food & Beverage Industry SIC #1000 & #1100		Tobacco Products Industry SIC #1200[1]		Rubber & Plastics Industry SIC #1500 & #1600		Leather & Allied Products Industry SIC #1700[1]		Primary Textiles & Textile Products Industry SIC #1800 & #1900[2]		Clothing Industry SIC #2400[1]		Wood Industry SIC #2500	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	6.58%	1.30e+08	10.00%	6.87e+06	8.24%	1.09e+08	10.00%	1.00e+07	2.19%	1.98e+07	6.00%	7.04e+06	0.14%	7.40e+05
- air compressors	0.84%	1.66e+07	0.00%	0.00	0.00%	0.00	0.00%	0.00	1.78%	1.61e+07	6.00%	7.04e+06	0.00%	0.00
- presses	0.38%	7.50e+06	0.00%	0.00	2.61%	3.46e+07	0.00%	0.00	0.40%	3.63e+06	0.00%	0.00	12.52%	6.62e+07
- pumps	14.29%	2.82e+08	0.00%	0.00	10.77%	1.43e+08	0.00%	0.00	12.02%	1.09e+08	0.00%	0.00	6.11%	3.23e+07
- machine tools	0.00%	0.00	0.00%	0.00	0.47%	6.23e+06	0.00%	0.00	0.46%	4.17e+06	0.00%	0.00	24.20%	1.28e+08
- mat. handling	29.84%	5.89e+08	50.00%	3.44e+07	17.53%	2.32e+08	10.00%	1.00e+07	33.92%	3.08e+08	54.00%	6.33e+07	7.41%	3.92e+07
- HVAC	13.32%	2.63e+08	0.00%	0.00	9.97%	1.32e+08	0.00%	0.00	14.70%	1.33e+08	0.00%	0.00	7.16%	3.78e+07
- cutting	1.27%	2.50e+07	0.00%	0.00	1.12%	1.48e+07	32.00%	3.21e+07	2.72%	2.47e+07	0.00%	0.00	24.96%	1.32e+08
- mixing	3.97%	7.83e+07	0.00%	0.00	27.85%	3.69e+08	0.00%	0.00	2.69%	2.44e+07	0.00%	0.00	0.00%	0.00
- grinding	0.94%	1.85e+07	0.00%	0.00	1.04%	1.38e+07	0.00%	0.00	5.07%	4.60e+07	0.00%	0.00	0.00%	0.00
- centrifuge	2.08%	4.10e+07	0.00%	0.00	0.00%	0.00	0.00%	0.00	5.30%	4.81e+07	0.00%	0.00	2.28%	1.20e+07
- vacuum	0.39%	7.69e+06	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	9.90%	1.31e+08	0.00%	0.00	4.03%	3.66e+07	0.00%	0.00	0.00%	0.00
- refrigeration	11.94%	2.36e+08	0.00%	0.00	0.92%	1.22e+07	0.00%	0.00	0.20%	1.81e+06	0.00%	0.00	0.00%	0.00
- trimming	0.00%	0.00	0.00%	0.00	1.18%	1.56e+07	0.00%	0.00	0.00%	0.00	0.00%	0.00	8.51%	4.49e+07
Subtotal	85.84%	1.69e+09	60.00%	4.12e+07	91.60%	1.21e+09	52.00%	5.22e+07	85.49%	7.75e+08	66.00%	7.74e+07	93.34%	4.93e+08
MISC. - heating	0.00%	0.00	0.00%	0.00	0.44%	5.83e+06	10.00%	1.00e+07	2.90%	2.63e+07	2.00%	2.35e+06	0.00%	0.00
- lighting	9.96%	1.96e+08	40.00%	2.75e+07	4.97%	6.59e+07	38.00%	3.82e+07	7.05%	6.40e+07	32.00%	3.75e+07	5.71%	3.02e+07
- miscellaneous	4.18%	8.24e+07	0.00%	0.00	3.15%	4.17e+07	0.00%	0.00	4.53%	4.11e+07	0.00%	0.00	1.04%	5.50e+06
- electrolysis	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	14.14%	2.79e+08	40.00%	2.75e+07	8.56%	1.13e+08	48.00%	4.82e+07	14.48%	1.31e+08	34.00%	3.99e+07	6.75%	3.57e+07
INDUSTRY TOTALS		1.972e+09		6.870e+07		1.325e+09		1.004e+08		9.075e+08		1.173e+08		5.284e+08

1 Data obtained from reference 2.

2 Due to the ambiguities in the industry classifications, the data for these two industries was combined.

Table 1B - Summary of the Electricity Use in Ontario's Industries

	Furniture & Fixtures Industry SIC #2600[1]		Paper & Allied Products Industry SIC #2700		Printing Publishing & Allied Industries SIC #2800[1]		Primary Metals Industry SIC #2900		Fabricated Metal Products Industry SIC #3000[1]		Machinery & Transportation Equipment Ind. SIC #3100 & #3200		Electrical & Electronic Products Industry SIC #3300[1]	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	5.00%	9.79e+06	2.87%	1.87e+08	5.00%	2.07e+07	2.30%	1.71e+08	5.00%	6.00e+07	3.01%	1.19e+08	4.00%	4.49e+07
- air compressors	5.00%	9.79e+06	0.00%	0.00	5.00%	2.07e+07	0.00%	0.00	5.00%	6.00e+07	4.69%	1.86e+08	4.00%	4.40e+07
- presses	0.00%	0.00	12.66%	8.25e+08	0.00%	0.00	4.30%	3.20e+08	0.00%	0.00	2.90%	1.15e+08	0.00%	0.00
- pumps	0.00%	0.00	10.03%	6.53e+08	5.00%	2.07e+07	0.72%	5.36e+07	0.00%	0.00	1.30%	4.90e+07	0.00%	0.00
- machine tools	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.48%	3.58e+07	0.00%	0.00	4.15%	1.65e+08	0.00%	0.00
- mat. handling	43.00%	8.42e+07	38.42%	2.50e+09	40.00%	1.65e+08	57.80%	4.30e+09	37.00%	4.44e+08	49.10%	1.95e+09	31.00%	3.41e+08
- HVAC	0.00%	0.00	0.98%	6.38e+07	0.00%	0.00	1.05%	7.82e+07	0.00%	0.00	7.21%	2.86e+08	0.00%	0.00
- cutting	0.00%	0.00	5.73%	3.73e+08	0.00%	0.00	0.17%	1.27e+07	0.00%	0.00	13.19%	5.23e+08	0.00%	0.00
- mixing	0.00%	0.00	3.68%	2.40e+08	0.00%	0.00	0.27%	2.01e+07	0.00%	0.00	0.00%	0.00	0.00%	0.00
- grinding	0.00%	0.00	4.21%	2.74e+08	0.00%	0.00	0.15%	1.12e+07	0.00%	0.00	2.87%	1.14e+08	0.00%	0.00
- centrifuge	0.00%	0.00	2.25%	1.47e+08	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- refrigeration	0.00%	0.00	0.22%	1.43e+07	0.00%	0.00	0.03%	2.23e+06	0.00%	0.00	0.00%	0.00	0.00%	0.00
- trimming	0.00%	0.00	0.77%	5.02e+07	0.00%	0.00	0.33%	2.46e+07	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	53.00%	1.04e+08	81.82%	5.33e+09	55.00%	2.27e+08	67.64%	5.04e+09	47.00%	5.64e+08	88.49%	3.51e+09	39.00%	4.29e+08
MISC. - heating	5.00%	9.79e+06	0.00%	0.00	1.00%	4.13e+06	20.39%	1.52e+09	31.00%	3.72e+08	2.53%	1.00e+08	21.00%	2.31e+08
- lighting	42.00%	8.22e+07	14.20%	9.25e+08	44.00%	1.82e+08	2.20%	1.64e+08	22.00%	2.64e+08	5.19%	2.06e+08	40.00%	4.40e+08
- miscellaneous	0.00%	0.00	4.03%	2.63e+08	0.00%	0.00	5.61%	4.18e+08	0.00%	0.00	3.53%	1.40e+08	0.00%	0.00
- electrolysis	0.00%	0.00	0.00%	0.00	0.00%	0.00	4.21%	3.14e+08	0.00%	0.00	0.27%	9.88e+06	0.00%	0.00
Subtotal	47.00%	9.20e+07	18.23%	1.19e+09	45.00%	1.86e+08	32.41%	1.33e+09	53.00%	6.36e+08	11.54%	4.58e+08	61.00%	6.72e+08
INDUSTRY TOTALS		1.958e+08		6.514e+09		4.133e+08		7.448e+09		1.200e+09		3.967e+09		1.101e+09

1 data from reference 2.

Table IC - Summary of Electricity Use in Ontario's Industry

	Non-Metal. Mineral Products Industry SIC #3500		Refined Petroleum & Coal Products Industry SIC #3600		Chemical & Chemical Products Industry SIC #3700		Other Manufacturing Industries SIC #3900		Mining [3]		Total of All Industries				
											Electrical Energy		Estimated Megawatts [4]		
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	1 shift	2 shifts	3 shifts
MOTORS - fans	15.95%	3.60e+08	13.55%	1.86e+08	13.69%	6.91e+08	0.04%	1.68e+05	45%	1.57e+09	9.6%	3.70e+09	1480	740	493
- air compressors	2.59%	5.85e+07	0.00%	0.00	3.05%	1.54e+08	0.44%	1.85e+06	30%	1.05e+09	4.2%	1.62e+09	648	324	216
- presses	2.85%	6.44e+07	0.00%	0.00	0.32%	1.62e+07	0.77%	3.24e+06	0%	0.00	3.8%	1.46e+09	584	292	195
- pumps	5.42%	1.22e+08	40.09%	5.50e+08	11.26%	5.68e+08	5.63%	2.37e+07	25%	8.75e+08	9.0%	3.48e+09	1392	696	464
- machine tools	0.00%	0.00	0.00%	0.00	0.08%	4.04e+06	0.00%	0.00	0%	0.00	0.9%	3.43e+08	137	69	46
- mat. handling	34.45%	7.78e+08	35.75%	4.91e+08	12.63%	6.38e+08	31.88%	1.34e+08	0%	0.00	34.1%	1.31e+10	5160	2580	1720
- HVAC	6.75%	1.52e+08	0.00%	0.00	3.74%	1.89e+08	7.72%	3.25e+07	0%	0.00	3.6%	1.37e+09	548	274	183
- cutting	0.00%	0.00	0.00%	0.00	0.00%	0.00	4.48%	1.88e+07	0%	0.00	3.0%	1.16e+09	464	232	155
- mixing	9.43%	2.13e+08	0.00%	0.00	6.49%	3.28e+08	24.65%	1.04e+08	0%	0.00	3.6%	1.38e+09	552	276	184
- grinding	11.98%	2.71e+08	0.00%	0.00	1.52%	7.67e+07	0.00%	0.00	0%	0.00	2.1%	8.25e+08	330	165	110
- centrifuge	0.00%	0.00	0.00%	0.00	0.84%	4.24e+07	0.00%	0.00	0%	0.00	0.7%	2.90e+08	116	58	39
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0%	0.00	0.02%	7.69e+06	3	1.5	1
- extrusion	0.87%	1.96e+07	0.00%	0.00	0.81%	4.09e+07	0.00%	0.00	0%	0.00	0.6%	2.28e+08	91	46	30
- refrigeration	0.00%	0.00	0.00%	0.00	2.54%	1.28e+08	7.24%	3.04e+07	0%	0.00	1.1%	4.25e+08	170	85	57
- trimming	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.32%	1.35e+06	0%	0.00	0.3%	1.36e+08	54	27	18
Subtotal	90.29%	2.04e+09	89.39%	1.23e+09	56.95%	2.88e+09	83.17%	3.50e+08	100%	3.50e+09	76.6%	2.95e+10	11800	5900	3933
MISC. - heating	0.00%	0.00	0.00%	0.00	14.26%	7.20e+08	1.44%	6.05e+06	0%	0.00	7.8%	3.01e+09	1204	602	401
- lighting	8.61%	1.94e+08	0.00%	0.00	8.11%	4.09e+08	10.60%	4.46e+07	0%	0.00	8.8%	3.37e+09	1348	674	449
- miscellaneous	1.07%	2.42e+07	10.62%	1.46e+08	7.18%	3.63e+08	4.80%	2.02e+07	0%	0.00	4.0%	1.55e+09	620	310	207
- electrolysis	0.00%	0.00	0.00%	0.00	13.56%	6.85e+08	0.00%	0.00	0%	0.00	2.6%	1.01e+09	400	200	133
Subtotal	9.68%	2.19e+08	10.62%	1.46e+08	43.11%	2.18e+09	16.84%	7.08e+07	0%	0.00	23.2%	8.93e+09	3572	1786	1191
INDUSTRY TOTALS		2.258e+09		1.372e+09		5.049e+09		4.204e+08		3.501e+09		3.846e+10	15384	7692	5128

3 data from Ontario Hydro Market Research Dept.

4 Megawatts estimated as Energy/Operating Hours, using 2500 hrs/yr, 5000 hrs/yr, and 7500 hrs/yr to represent one, two, and three shift operation (ie. 52 weeks/yr X 6 days/week X 8 hours/shift is approximately 2500 hours/shift/year).

Table 2A - Electricity Consumption in the Food & Beverage Industry										
	Meat & Poultry SIC #1010		Fruit & Vegetables SIC #1030		Dairy Products SIC #1040		Flour, Cereal, Food & Feed SIC #1050		Vegetable Oil SIC #1060	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	7.60%	2.41e+07	0.66%	8.88e+05	15.47%	3.66e+07	0.00%	0.00	13.25%	8.27e+06
- air compressors	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- presses	0.00%	0.00	2.20%	2.96e+06	0.00%	0.00	0.00%	0.00	0.00%	0.00
- pumps	4.22%	1.34e+07	8.83%	1.19e+07	28.48%	6.74e+07	23.25%	5.97e+07	16.87%	1.05e+07
- machine tools	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mat. handling	32.01%	1.02e+08	51.38%	6.91e+07	25.33%	5.99e+07	23.25%	5.97e+07	67.48%	4.21e+07
- HVAC	4.01%	1.27e+07	9.87%	1.33e+07	7.14%	1.69e+07	39.44%	1.01e+08	0.00%	0.00
- cutting	1.18%	3.74e+06	6.92%	9.31e+06	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mixing	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- grinding	0.00%	0.00	1.89%	2.54e+06	0.00%	0.00	0.00%	0.00	0.00%	0.00
- centrifuge	0.00%	0.00	0.00%	0.00	0.00%	0.00	9.86%	2.53e+07	0.00%	0.00
- refrigeration	37.00%	1.17e+08	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- vacuum	0.00%	0.00	2.51%	3.38e+06	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	86.02%	2.73e+08	84.26%	1.13e+08	76.42%	1.81e+08	95.80%	2.46e+08	97.60%	6.09e+07
MISC. - heating	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- lighting	14.01%	4.45e+07	9.87%	1.33e+07	5.71%	1.35e+07	4.23%	1.09e+07	2.41%	1.50e+06
- miscellaneous	0.00%	0.00	5.91%	7.95e+06	17.85%	4.22e+07	0.00%	0.00	0.00%	0.00
Subtotal	14.01%	4.45e+07	15.78%	2.13e+07	23.56%	5.57e+07	4.23%	1.09e+07	2.41%	1.50e+06
INDUSTRY TOTALS		3.173e+08		1.345e+08		2.366e+08		2.569e+08		6.240e+07

Table 2B - Electricity Consumption in the Food & Beverage Industry										
	Bakery Products SIC #1070		Sugar SIC #1083		Beverages SIC #1130		Others		Total of Food & Beverage Industry	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	8.87%	9.76e+06	5.50%	5.12e+06	2.77%	3.67e+06	6.58%	4.14e+07	6.58%	1.30e+08
- air compressors	4.39%	4.83e+06	0.00%	0.00	4.88%	6.47e+06	0.84%	5.28e+06	0.84%	1.66e+07
- presses	0.00%	0.00	0.03%	2.79e+04	1.55%	2.06e+06	0.38%	2.39e+06	0.38%	7.50e+06
- pumps	0.00%	0.00	20.43%	1.90e+07	7.57%	1.00e+07	14.29%	8.99e+07	14.29%	2.82e+08
- machine tools	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mat. handling	27.74%	3.05e+07	7.59%	7.06e+06	23.00%	3.05e+07	29.84%	1.88e+08	29.84%	5.89e+08
- HVAC	7.13%	7.84e+06	16.90%	1.57e+07	8.70%	1.15e+07	13.32%	8.38e+07	13.32%	2.63e+08
- cutting	3.56%	3.92e+06	0.13%	1.21e+05	0.00%	0.00	1.27%	7.99e+06	1.27%	2.50e+07
- mixing	14.59%	1.60e+07	37.98%	3.53e+07	1.55%	2.06e+06	3.97%	2.50e+07	3.97%	7.83e+07
- grinding	0.00%	0.00	0.00%	0.00	7.59%	1.01e+07	0.94%	5.91e+06	0.94%	1.85e+07
- centrifuge	0.00%	0.00	2.83%	2.63e+06	0.00%	0.00	2.08%	1.31e+07	2.08%	4.10e+07
- refrigeration	0.33%	3.63e+05	0.00%	0.00	32.42%	4.30e+07	11.94%	7.51e+07	11.94%	2.36e+08
- vacuum	0.00%	0.00	1.99%	1.85e+06	0.00%	0.00	0.39%	2.45e+06	0.39%	7.69e+06
Subtotal	66.61%	7.32e+07	93.38%	8.68e+07	90.03%	1.19e+08	85.84%	5.40e+08	85.84%	1.69e+09
MISC. - heating	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- lighting	27.89%	3.07e+07	6.67%	6.20e+06	9.97%	1.32e+07	9.96%	6.27e+07	9.96%	1.96e+08
- miscellaneous	5.48%	6.03e+06	0.00%	0.00	0.00%	0.00	4.18%	2.63e+07	4.18%	8.24e+07
Subtotal	33.37%	3.67e+07	6.67%	6.20e+06	9.97%	1.32e+07	14.14%	8.90e+07	14.14%	2.79e+08
INDUSTRY TOTALS		1.100e+08		9.300e+07		1.326e+08		6.291e+08		1.972e+09

Table 3 - Electricity Consumption in the Rubber & Plastics Industry								
	Rubber Products SIC #1590		Plastic Products SIC #1690		Others		Total of Rubber & Plastics Industry	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	13.09%	7.59e+07	1.90%	8.42e+06	8.24%	2.49e+07	8.24%	1.09e+08
- air compressors	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- presses	4.29%	2.49e+07	0.40%	1.77e+06	2.61%	7.88e+06	2.61%	3.46e+07
- pumps	4.90%	2.84e+07	18.46%	8.18e+07	10.77%	3.25e+07	10.77%	1.43e+08
- machine tools	0.82%	4.76e+06	0.00%	0.00	0.47%	1.42e+06	0.47%	6.23e+06
- mat. handling	23.21%	1.35e+08	10.01%	4.44e+07	17.53%	5.29e+07	17.53%	2.32e+08
- HVAC	10.00%	5.80e+07	9.93%	4.40e+07	9.97%	3.01e+07	9.97%	1.32e+08
- cutting	1.05%	6.09e+06	1.20%	5.32e+06	1.12%	3.38e+06	1.12%	1.48e+07
- mixing	28.19%	1.64e+08	27.19%	1.21e+08	27.85%	8.41e+07	27.85%	3.69e+08
- grinding	1.82%	1.06e+07	0.00%	0.00	1.04%	3.14e+06	1.04%	1.38e+07
- centrifuge	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	3.42%	1.98e+07	18.40%	8.15e+07	9.90%	2.99e+07	9.90%	1.31e+08
- refrigeration	1.62%	9.40e+06	0.00%	0.00	0.92%	2.78e+06	0.92%	1.22e+07
- trimming	0.00%	0.00	2.72%	1.21e+07	1.18%	3.56e+06	1.18%	1.56e+07
Subtotal	92.41%	5.36e+08	90.21%	4.00e+08	91.60%	2.76e+08	91.60%	1 21e+09
MISC. - heating	0.77%	4.47e+06	0.00%	0.00	0.44%	1.33e+06	0.44%	5.83e+06
- lighting	4.99%	2.89e+07	4.96%	2.20e+07	4.97%	1.50e+07	4.97%	6.59e+07
- miscellaneous	1.86%	1.08e+07	4.82%	2.14e+07	3.15%	9.51e+06	3.15%	4.17e+07
Subtotal	7.62%	4.42e+07	9.78%	4.33e+07	8.56%	2.58e+07	8.56%	1.13e+08
INDUSTRY TOTALS		5.800e+08		4.432e+08		3.018e+08		1.325e+09

Table 4 - Electricity Consumption in the Primary Textiles Industry								
	Man-Made Fibers SIC #1810		Spun Yarn & Woven Cloth SIC #1820		Others		Total of Primary Textiles Industry	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	1.72%	7.03e+06	3.22%	6.16e+06	2.19%	4.66e+05	2.19%	1.36e+07
- air compressors	0.00%	0.00	5.60%	1.07e+07	1.78%	3.79e+05	1.78%	1.11e+07
- presses	0.00%	0.00	1.24%	2.37e+06	0.40%	8.52e+04	0.40%	2.49e+06
- pumps	8.68%	3.55e+07	19.16%	3.66e+07	12.02%	2.56e+06	12.02%	7.47e+07
- machine tools	0.00%	0.00	1.45%	2.77e+06	0.46%	9.80e+04	0.46%	2.86e+06
- mat. handling	39.49%	1.61e+08	22.23%	4.25e+07	33.92%	7.22e+06	33.92%	2.11e+08
- HVAC	18.98%	7.76e+07	5.57%	1.06e+07	14.70%	3.13e+06	14.70%	9.13e+07
- cutting	0.00%	0.00	8.52%	1.63e+07	2.72%	5.79e+05	2.72%	1.69e+07
- mixing	3.26%	1.33e+07	1.47%	2.81e+06	2.69%	5.73e+05	2.69%	1.67e+07
- grinding	6.63%	2.71e+07	1.74%	3.33e+06	5.07%	1.08e+06	5.07%	3.15e+07
- centrifuge	5.53%	2.26e+07	4.81%	9.20e+06	5.30%	1.13e+06	5.30%	3.29e+07
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	4.22%	1.73e+07	3.60%	6.88e+06	4.03%	8.58e+05	4.03%	2.50e+07
- refrigeration	0.29%	1.19e+06	0.00%	0.00	0.20%	4.26e+04	0.20%	1.24e+06
- trimming	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	88.80%	3.63e+08	78.61%	1.50e+08	85.49%	1.82e+07	85.49%	5.31e+08
MISC. - heating	1.54%	6.30e+06	5.80%	1.11e+07	2.90%	6.18e+05	2.90%	1.80e+07
- lighting	5.91%	2.42e+07	9.48%	1.81e+07	7.05%	1.50e+06	7.05%	4.38e+07
- miscellaneous	3.78%	1.55e+07	6.14%	1.17e+07	4.53%	9.65e+05	4.53%	2.81e+07
Subtotal	11.23%	4.59e+07	21.42%	4.10e+07	14.48%	3.08e+06	14.48%	9.00e+07
INDUSTRY TOTALS		4.088e+08		1.912e+08		2.130e+07		6.213e+08

Table 5 - Electricity Consumption in the Wood Industry								
	Saw Mills, Planing & Shingle Mills SIC #2510		Other Wood Industries SIC #2590		Others		Total of Wood Industry	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	0.00%	0.00	0.35%	5.93e+05	0.14%	1.67e+05	0.14%	7.40e+05
- air compressors	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- presses	0.00%	0.00	30.23%	5.12e+07	12.52%	1.49e+07	12.52%	6.62e+07
- pumps	4.35%	1.04e+07	8.59%	1.46e+07	6.11%	7.30e+06	6.11%	3.23e+07
- machine tools	41.32%	9.90e+07	0.00%	0.00	24.20%	2.89e+07	24.20%	1.28e+08
- mat. handling	0.00%	0.00	17.86%	3.03e+07	7.41%	8.85e+06	7.41%	3.92e+07
- HVAC	8.70%	2.08e+07	5.01%	8.49e+06	7.16%	8.55e+06	7.16%	3.78e+07
- cutting	28.99%	6.95e+07	19.24%	3.26e+07	24.96%	2.98e+07	24.96%	1.32e+08
- mixing	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- grinding	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- centrifuge	0.00%	0.00	5.50%	9.32e+06	2.28%	2.72e+06	2.28%	1.20e+07
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- refrigeration	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- trimming	8.70%	2.08e+07	8.25%	1.40e+07	8.51%	1.01e+07	8.51%	4.49e+07
Subtotal	92.06%	2.21e+08	95.03%	1.61e+08	93.34%	1.11e+08	93.34%	4.93e+08
MISC. - heating	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- lighting	7.97%	1.91e+07	2.50%	4.24e+06	5.71%	6.82e+06	5.71%	3.02e+07
- miscellaneous	0.00%	0.00	2.50%	4.24e+06	1.04%	1.24e+06	1.04%	5.50e+06
Subtotal	7.97%	1.91e+07	5.00%	8.47e+06	6.75%	8.06e+06	6.75%	3.57e+07
INDUSTRY TOTALS		2.396e+08		1.694e+08		1.194e+08		5.284e+08

Table 6 - Electricity Consumption in the Paper & Allied Industries								
	Pulp & Paper Industries SIC #2710		Paper Box & Bag Industry SIC #2730		Others		Total of Paper & Allied Industries	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	2.94%	1.80e+08	0.00%	0.00	2.87%	7.00e+06	2.87%	1.87e+08
- air compressors	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- presses	12.93%	7.94e+08	0.00%	0.00	12.66%	3.09e+07	12.66%	8.25e+08
- pumps	10.25%	6.29e+08	0.00%	0.00	10.03%	2.45e+07	10.03%	6.53e+08
- machine tools	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mat. handling	37.61%	2.31e+09	74.20%	9.88e+07	38.42%	9.37e+07	38.42%	2.50e+09
- HVAC	1.00%	6.14e+07	0.00%	0.00	0.98%	2.39e+06	0.98%	6.38e+07
- cutting	5.50%	3.38e+08	16.13%	2.15e+07	5.73%	1.40e+07	5.73%	3.73e+08
- mixing	3.77%	2.31e+08	0.00%	0.00	3.68%	8.98e+06	3.68%	2.40e+08
- grinding	4.30%	2.64e+08	0.00%	0.00	4.21%	1.03e+07	4.21%	2.74e+08
- centrifuge	2.30%	1.41e+08	0.00%	0.00	2.25%	5.49e+06	2.25%	1.47e+08
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- refrigeration	0.22%	1.35e+07	0.00%	0.00	0.22%	5.37e+05	0.22%	1.43e+07
- trimming	0.79%	4.85e+07	0.00%	0.00	0.77%	1.88e+06	0.77%	5.02e+07
Subtotal	81.61%	5.01e+09	90.33%	1.20e+08	81.82%	2.00e+08	81.82%	5.33e+09
MISC. - heating	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- lighting	14.43%	8.86e+08	3.23%	4.30e+06	14.20%	3.46e+07	14.20%	9.25e+08
- miscellaneous	3.97%	2.44e+08	6.45%	8.58e+06	4.03%	9.83e+06	4.03%	2.63e+08
Subtotal	18.40%	1.13e+09	9.68%	1.29e+07	18.23%	4.45e+07	18.23%	1.19e+09
INDUSTRY TOTALS		6.137e+09		1.331e+08		2.439e+08		6.514e+09

Table 7 - Electricity Consumption in the Primary Metal Industry

	Primary Steel SIC #2910		Iron Foundaries SIC #2940		Non-Ferrous Metals SIC #2950		Aluminum Rolling, Casting & Extruding SIC #2960		Other Metal Rolling, Casting Etc... SIC #2990		Others		Total of Primary Metal Industry	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	0.26%	1.16e+07	0.00%	0.00	8.34%	1.48e+08	0.00%	0.00	1.99%	3.15e+06	2.30%	8.67e+06	2.30%	1.71e+08
- air compressors	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- presses	0.00%	0.00	0.00%	0.00	10.61%	1.88e+08	47.83%	1.18e+08	0.00%	0.00	4.30%	1.62e+07	4.30%	3.20e+08
- pumps	0.26%	1.16e+07	0.00%	0.00	0.88%	1.56e+07	9.50%	2.35e+07	0.08%	1.27e+05	0.72%	2.71e+06	0.72%	5.36e+07
- machine tools	0.00%	0.00	0.00%	0.00	1.91%	3.38e+07	0.00%	0.00	0.00%	0.00	0.48%	1.81e+06	0.48%	3.58e+07
- mat. handling	81.97%	3.66e+09	20.89%	9.02e+07	15.57%	2.76e+08	23.51%	5.82e+07	2.11%	3.34e+06	57.80%	2.18e+08	57.80%	4.30e+09
- HVAC	1.46%	6.51e+07	1.73%	7.47e+06	0.00%	0.00	0.00%	0.00	0.91%	1.44e+06	1.05%	3.96e+06	1.05%	7.82e+07
- cooling	0.00%	0.00	0.00%	0.00	0.00%	0.00	4.67%	1.16e+07	0.16%	2.54e+05	0.17%	6.41e+05	0.17%	1.27e+07
- mixing	0.00%	0.00	4.32%	1.87e+07	0.01%	8.86e+04	0.00%	0.00	0.17%	2.69e+05	0.27%	1.02e+06	0.27%	2.01e+07
- grinding	0.00%	0.00	0.00%	0.00	0.59%	1.05e+07	0.00%	0.00	0.17%	2.69e+05	0.15%	5.65e+05	0.15%	1.12e+07
- centrifuge	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- refrigeration	0.00%	0.00	0.00%	0.00	0.12%	2.13e+06	0.00%	0.00	0.00%	0.00	0.03%	1.13e+05	0.03%	2.23e+06
- trimming	0.00%	0.00	0.00%	0.00	0.00%	0.00	9.50%	2.35e+07	0.01%	1.59e+04	0.33%	1.24e+06	0.33%	2.46e+07
Subtotal	83.95%	3.75e+09	26.94%	1.16e+08	38.03%	6.74e+08	95.01%	2.35e+08	5.60%	8.88e+06	67.64%	2.55e+08	67.64%	5.04e+09
MISC. - heating	14.60%	6.51e+08	73.06%	3.16e+08	18.47%	3.27e+08	0.00%	0.00	93.60%	1.48e+08	20.39%	7.68e+07	20.39%	1.52e+09
- lighting	1.46%	6.51e+07	0.00%	0.00	5.04%	8.93e+07	0.00%	0.00	0.84%	1.33e+06	2.20%	8.29e+06	2.20%	1.64e+08
- miscellaneous	0.00%	0.00	0.00%	0.00	21.66%	3.84e+08	5.00%	1.24e+07	0.00%	0.00	5.61%	2.11e+07	5.61%	4.18e+08
- electrolysis	0.00%	0.00	0.00%	0.00	16.82%	2.98e+08	0.00%	0.00	0.00%	0.00	4.21%	1.59e+07	4.21%	3.14e+08
Subtotal	16.06%	7.16e+08	73.06%	3.16e+08	61.99%	1.10e+09	5.00%	1.24e+07	94.44%	1.50e+08	32.41%	1.22e+08	32.41%	2.41e+09
INDUSTRY TOTALS		4.461e+09		4.319e+08		1.772e+09		2.477e+08		1.585+08		3.769e+08		7.448e+09

Table 8 - Electricity Consumption in the Machinery & Transportation Equipment Industry

	Farm Machinery & Equipment SIC #3110		Construction Machinery SIC #3190		Motor Vehicles Industry SIC #3230		Motor Vehicles Parts & Accessories SIC #3250		Others		Total of Machinery & Transportation Equipment Industry	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	22.37%	2.32e+07	18.73%	8.46e+07	0.27%	2.41e+06	0.00%	0.00	3.01%	9.29e+06	3.01%	1.19e+08
- air compressors	6.01%	6.22e+06	5.35%	2.42e+07	3.92%	3.50e+07	4.79%	1.06e+08	4.69%	1.45e+07	4.69%	1.86e+08
- presses	10.12%	1.05e+07	4.16%	1.88e+07	8.59%	7.67e+07	0.00%	0.00	2.90%	8.96e+06	2.90%	1.15e+08
- pumps	1.39%	1.44e+06	9.99%	4.51e+07	0.27%	2.41e+06	0.00%	0.00	1.30%	4.16e+06	1.30%	4.90e+07
- machine tools	9.48%	9.81e+06	8.20%	3.70e+07	0.00%	0.00	4.73%	1.05e+08	4.15%	1.28e+07	4.15%	1.65e+08
- mat. handling	11.38%	1.18e+07	17.42%	7.87e+07	60.08%	5.36e+08	52.95%	1.17e+09	49.10%	1.52e+08	49.10%	1.95e+09
- HVAC	0.00%	0.00	0.00%	0.00	4.80%	4.29e+07	10.00%	2.21e+08	7.21%	2.23e+07	7.21%	2.86e+08
- cutting	6.02%	6.23e+06	5.35%	2.42e+07	18.94%	1.69e+08	12.80%	2.83e+08	13.19%	4.07e+07	13.19%	5.23e+08
- mixing	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- grinding	0.00%	0.00	0.00%	0.00	0.00%	0.00	4.73%	1.05e+08	2.87%	8.86e+06	2.87%	1.14e+08
- centrifuge	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- refrigeration	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- trimming	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	66.77%	6.91e+07	69.20%	3.13e+08	96.87%	8.65e+08	90.00%	1.99e+09	88.49%	2.73e+08	88.49%	3.51e+09
MISC. - heating	18.14%	1.88e+07	16.05%	7.25e+07	0.14%	1.25e+06	0.00%	0.00	2.53%	7.81e+06	2.53%	1.00e+08
- lighting	0.00%	0.00	14.74%	6.66e+07	1.49%	1.33e+07	5.00%	1.10e+08	5.19%	1.60e+07	5.19%	2.06e+08
- miscellaneous	5.64%	5.84e+06	0.00%	0.00	1.49%	1.33e+07	5.00%	1.10e+08	3.53%	1.09e+07	3.53%	1.40e+08
- electrolysis	9.43%	9.76e+06	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.27%	8.34e+05	0.27%	9.88e+06
Subtotal	23.78%	2.46e+07	30.79%	1.39e+08	3.12%	2.79e+07	10.00%	2.21e+08	11.54%	3.56e+07	11.54%	4.58e+08
INDUSTRY TOTALS		1.035e+08		4.518e+08		8.928e+08		2.210e+09		3.088e+08		3.967e+09

Table 9 - Electricity Consumption in the Non-Metallic Mineral Products Industry

	Redi-Mix Concrete SIC #3550		Glass SIC #3562		Lime SIC #3580		Other Non-Metal Mineral Products SIC #3599		Others		Total of Non-Metal. Mineral Products Industry	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	0.00%	0.00	13.88%	1.97e+07	19.87%	1.39e+07	17.62%	6.07e+07	15.95%	2.66e+08	15.95%	3.60e+08
- air compressors	0.00%	0.00	10.76%	1.53e+07	0.00%	0.00	0.00%	0.00	2.59%	4.32e+07	2.59%	5.85e+07
- presses	0.00%	0.00	10.07%	1.43e+07	0.00%	0.00	0.74%	2.55e+06	2.85%	4.75e+07	2.85%	6.44e+07
- pumps	0.00%	0.00	1.63%	2.32e+06	16.94%	1.18e+07	5.20%	1.79e+07	5.42%	9.03e+07	5.42%	1.22e+08
- machine tools	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mat. handling	0.00%	0.00	40.97%	5.83e+07	24.95%	1.74e+07	37.21%	1.28e+08	34.45%	5.74e+08	34.45%	7.78e+08
- HVAC	0.00%	0.00	7.53%	1.07e+07	0.00%	0.00	8.48%	2.92e+07	6.75%	1.13e+08	6.75%	1.52e+08
- cutting	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mixing	32.14%	1.12e+07	5.37%	7.64e+06	0.00%	0.00	10.71%	3.69e+07	9.43%	1.57e+08	9.43%	2.13e+08
- grinding	55.04%	1.92e+07	2.30%	3.27e+06	31.25%	2.18e+07	7.74%	2.66e+07	11.98%	2.00e+08	11.98%	2.71e+08
- centrifuge	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.00%	0.00	1.49%	5.13e+06	0.87%	1.45e+07	0.87%	1.96e+07
- refrigeration	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- trimming	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	87.18%	3.04e+07	92.51%	1.32e+08	93.01%	6.50e+07	89.19%	3.07e+08	90.29%	1.50e+09	90.29%	2.04e+09
MISC. - heating	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- lighting	6.42%	2.24e+06	7.53%	1.07e+07	3.50%	2.45e+06	10.32%	3.55e+07	8.61%	1.44e+08	8.61%	1.94e+08
- miscellaneous	6.42%	2.24e+06	0.00%	0.00	3.50%	2.45e+06	0.47%	1.62e+06	1.07%	1.78e+07	1.07%	2.42e+07
Subtotal	12.84%	4.48e+06	7.53%	1.07e+07	7.00%	4.89e+06	10.79%	3.71e+07	9.68%	1.61e+08	9.68%	2.19e+08
INDUSTRY TOTALS		3.490e+07		1.422e+08		6.990e+07		3.443e+08		1.667e+09		2.258e+09

Table 10 - Electricity Consumption in the Refined Petroleum and Coal Products Industry						
	Other Petroleum & Coal Products SIC #3690		Others		Total of Refined Petroleum & Coal Products Industry	
	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	13.55%	9.08e+05	13.55%	1.85e+08	13.55%	1.86e+08
- air compressors	0.00%	0.00	0.00%	0.00	0.00%	0.00
- presses	0.00%	0.00	0.00%	0.00	0.00%	0.00
- pumps	40.09%	2.69e+06	40.09%	5.47e+08	40.09%	5.50e+08
- machine tools	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mat. handling	35.75%	2.40e+06	35.75%	4.88e+08	35.75%	4.90e+08
- HVAC	0.00%	0.00	0.00%	0.00	0.00%	0.00
- cutting	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mixing	0.00%	0.00	0.00%	0.00	0.00%	0.00
- grinding	0.00%	0.00	0.00%	0.00	0.00%	0.00
- centrifuge	0.00%	0.00	0.00%	0.00	0.00%	0.00
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.00%	0.00
- refrigeration	0.00%	0.00	0.00%	0.00	0.00%	0.00
- trimming	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	89.39%	5.99e+06	89.39%	1.22e+09	89.39%	1.23e+09
MISC. - heating	0.00%	0.00	0.00%	0.00	0.00%	0.00
- lighting	0.00%	0.00	0.00%	0.00	0.00%	0.00
- miscellaneous	10.62%	7.12e+05	10.62%	1.45e+08	10.62%	1.46e+08
Subtotal	10.62%	7.12e+05	10.62%	1.45e+08	10.62%	1.46e+08
INDUSTRY TOTALS		6.700e+06		1.365e+09		1.372e+09

Table 11A - Electricity Consumption in the Chemical & Chemical Products Industry								
	Industrial Chemicals Industry SIC #3710		Agricultural Chemical Industry SIC #3720		Plastic & Synthetic Resin Industry SIC #3730		Pharmaceutical Preparations SIC #3740	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	18.23%	6.52e+08	0.24%	1.14e+06	1.21%	5.90e+06	0.98%	1.06e+06
- air compressors	2.13%	7.62e+07	0.30%	1.42e+06	14.99%	7.31e+07	0.00%	0.00
- presses	0.32%	1.14e+07	0.00%	0.00	0.00%	0.00	4.04%	4.38e+06
- pumps	9.00%	3.22e+08	37.59%	1.78e+08	2.26%	1.10e+07	8.95%	9.70e+06
- machine tools	0.00%	0.00	0.00%	0.00	0.76%	3.71e+06	0.00%	0.00
- mat. handling	10.27%	3.67e+08	30.83%	1.46e+08	14.95%	7.29e+07	17.89%	1.94e+07
- HVAC	2.07%	7.40e+07	0.00%	0.00	9.09%	4.43e+07	21.71%	2.35e+07
- cutting	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mixing	5.16%	1.85e+08	0.11%	5.20e+05	17.18%	8.38e+07	22.16%	2.40e+07
- grinding	0.06%	2.15e+06	15.44%	7.30e+07	0.00%	0.00	0.00%	0.00
- centrifuge	0.08%	2.86e+06	0.00%	0.00	7.97%	3.89e+07	0.00%	0.00
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.15%	5.36e+06	0.00%	0.00	7.13%	3.48e+07	0.00%	0.00
- refrigeration	1.38%	4.94e+07	0.17%	8.04e+05	15.42%	7.52e+07	0.00%	0.00
- trimming	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	48.83%	1.75e+09	84.68%	4.01e+08	90.96%	4.44e+08	75.73%	8.21e+07
MISC. - heating	14.79%	5.29e+08	6.91%	3.27e+07	0.00%	0.00	0.00%	0.00
- lighting	9.82%	3.51e+08	0.28%	1.32e+06	4.53%	2.21e+07	24.25%	2.63e+07
- miscellaneous	7.86%	2.81e+08	8.41%	3.98e+07	4.53%	2.21e+07	0.00%	0.00
- electrolysis	18.73%	6.70e+08	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	51.20%	1.83e+09	15.60%	7.38e+07	9.06%	4.42e+07	24.25%	2.63e+07
INDUSTRY TOTALS		3.576e+09		4.730e+08		4.876e+08		1.084e+08

Table 11B - Electricity Consumption in the Chemical & Chemical Products Industry								
	Soap & Cleaning Compounds SIC #3760		Other Chemical Products SIC #3790		Others		Total of Chemical & Chemical Products Industry	
	% of total	kWh	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	9.62%	1.07e+07	3.23%	5.99e+06	13.69%	1.50e+07	13.69%	6.91e+08
- air compressors	0.00%	0.00	0.00%	0.00	3.05%	3.27e+06	3.05%	1.54e+08
- presses	0.00%	0.00	0.00%	0.00	0.32%	3.43e+05	0.32%	1.62e+07
- pumps	21.16%	2.36e+07	6.46%	1.20e+07	11.26%	1.20e+07	11.26%	5.68e+08
- machine tools	0.00%	0.00	0.00%	0.00	0.08%	8.57e+04	0.08%	4.04e+06
- mat. handling	11.54%	1.29e+07	3.23%	5.99e+06	12.63%	1.35e+07	12.63%	6.38e+08
- HVAC	38.46%	4.29e+07	0.00%	0.00	3.74%	4.01e+06	3.74%	1.89e+08
- cutting	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mixing	19.23%	2.15e+07	3.23%	5.99e+06	6.49%	6.95e+06	6.49%	3.28e+08
- grinding	0.00%	0.00	0.00%	0.00	1.52%	1.63e+06	1.52%	7.67e+07
- centrifuge	0.00%	0.00	0.00%	0.00	0.84%	9.00e+05	0.84%	4.24e+07
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.81%	8.68e+05	0.81%	4.09e+07
- refrigeration	0.00%	0.00	0.00%	0.00	2.54%	2.72e+06	2.54%	1.28e+08
- trimming	0.00%	0.00	0.00%	0.00	0.00%	0.00	0.00%	0.00
Subtotal	100.0%	1.12e+08	16.15%	2.99e+07	56.97%	6.10e+07	56.97%	2.88e+09
MISC. - heating	0.00%	0.00	77.42%	1.43e+08	14.26%	1.53e+07	14.26%	7.20e+08
- lighting	0.00%	0.00	0.00%	0.00	8.11%	8.69e+06	8.11%	4.09e+08
- miscellaneous	0.00%	0.00	6.45%	1.20e+07	7.18%	7.69e+06	7.18%	3.63e+08
- electrolysis	0.00%	0.00	0.00%	0.00	13.56%	1.45e+07	13.56%	6.85e+08
Subtotal	0.00%	0.00	83.87%	1.55e+08	43.11%	4.62e+07	43.11%	2.18e+09
INDUSTRY TOTALS		1.116e+08		1.853e+08		1.071e+08		5.049e+09

Table 12 - Electricity Consumption in Other Manufacturing Industries						
	Other Instruments, Related Products SIC #3912		Others		Total of Other Manufacturing Industries	
	% of total	kWh	% of total	kWh	% of total	kWh
MOTORS - fans	0.04%	3.14e+04	0.04%	1.37e+05	0.04%	1.68e+05
- air compressors	0.44%	3.45e+05	0.44%	1.50e+06	0.44%	1.85e+06
- presses	0.77%	6.04e+05	0.77%	2.63e+06	0.77%	3.24e+06
- pumps	5.63%	4.42e+06	5.63%	1.92e+07	5.63%	2.37e+07
- machine tools	0.00%	0.00	0.00%	0.00	0.00%	0.00
- mat. handling	31.88%	2.50e+07	31.88%	1.09e+08	31.88%	1.34e+08
- HVAC	7.72%	6.06e+06	7.72%	2.64e+07	7.72%	3.25e+07
- cutting	4.48%	3.52e+06	4.48%	1.53e+07	4.48%	1.88e+07
- mixing	24.65%	1.94e+07	24.65%	8.43e+07	24.65%	1.04e+08
- grinding	0.00%	0.00	0.00%	0.00	0.00%	0.00
- centrifuge	0.00%	0.00	0.00%	0.00	0.00%	0.00
- vacuum	0.00%	0.00	0.00%	0.00	0.00%	0.00
- extrusion	0.00%	0.00	0.00%	0.00	0.00%	0.00
- refrigeration	7.24%	5.68e+06	7.24%	2.48e+07	7.24%	3.04e+07
- trimming	0.32%	2.51e+05	0.32%	1.09e+06	0.32%	1.35e+06
Subtotal	83.17%	6.53e+07	83.17%	2.84e+08	83.17%	3.50e+08
MISC. - heating	1.44%	1.13e+06	1.44%	4.92e+06	1.44%	6.05e+06
- lighting	10.60%	8.32e+06	10.60%	3.62e+07	10.60%	4.46e+07
- miscellaneous	4.80%	3.77e+06	4.80%	1.64e+07	4.80%	2.02e+07
Subtotal	16.84%	1.32e+07	16.84%	5.76e+07	16.84%	7.08e+07
INDUSTRY TOTALS		7.850e+07		3.419e+08		4.204e+08

Table 13 - Comparison of General End Use Categories With Ontario Hydro Data		
	Ontario Hydro data - ref. 4	Data from current study
motors	73%	77%
lighting	11%	9%
process heat, electrolysis, & miscellaneous	16%	14%

Table 14 - Comparison of Industrial Motor Usage Data (% of total industrial electrical energy consumption)			
Data from current study [1]		U.S. Dept. of Energy data - ref. 3 [2]	
pumps	10%	pumps	24%
air compressors, refrigeration, & vacuum	5%	compressors	12%
fans	10%	blowers & fans	12%
machine tools/ presses	4%	machine tools	7%

1 from table 1C

2 motor manufacturers provided these estimates by extrapolating from 1/2 to 2/3 of the international motor sales, using motor sizes (kW) and expected usage (hours/year)

References

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